

The tau neutrino cross section relative to the electron neutrino cross section

$$\begin{aligned} \frac{\sigma_{\nu_\tau}^{const}}{\sigma_{\nu_e}^{const}} &= \frac{N_{\nu_\tau}^{obs} \int \Phi_{\nu_e}^{tar} \epsilon_{\nu_e} E_{\nu_e} dE}{N_{\nu_e}^{obs} \int \Phi_{\nu_\tau}^{tar} \epsilon_{\nu_\tau} K_F(E) E_{\nu_\tau} dE} \\ &= \frac{N_{\nu_\tau}^{obs}}{N_{\nu_e}^{obs}} \times \frac{\epsilon_{\nu_e}}{\epsilon_{\nu_\tau}} \times \frac{N_{\nu_e}^{prod}}{N_{\nu_\tau}^{prod}} \times \frac{\int E_{\nu_e} (dN_{\nu_e}^{prod} / dE) dE}{\int K_F(E) E_{\nu_\tau} (dN_{\nu_\tau}^{prod} / dE) dE} \\ &= 1.5 \pm 0.5 (\text{error of (1)}) \pm 0.3 (\text{error of (2)}) \quad (\text{Preliminary}) \end{aligned}$$

$$\left\{ \begin{array}{l} \frac{N_{\nu_\tau}^{obs}}{N_{\nu_e}^{obs}} = \frac{(9 \pm \sqrt{9}) - 2.4}{145 \pm \sqrt{145}} \cdots (1) \\ \frac{\epsilon_{\nu_e}}{\epsilon_{\nu_\tau}} = \frac{0.80}{0.50} \\ \frac{N_{\nu_\tau}^{prod}}{N_{\nu_e}^{prod}} = 0.15 \pm 0.03 \cdots (2) \quad (\text{From Emily's thesis - page 157}) \\ \frac{\int K_F(E) E_{\nu_\tau} (dN_{\nu_\tau}^{prod} / dE) dE}{\int E_{\nu_e} (dN_{\nu_e}^{prod} / dE) dE} = 0.320 \pm 0.002 \quad (\text{From Emily's thesis - page 160}) \end{array} \right.$$

The tau neutrino cross section relative to the muon neutrino cross section

$$\frac{\sigma_{\nu_\tau}^{const}}{\sigma_{\nu_\mu}^{const}} = \frac{N_{\nu_\tau}^{obs} \int \Phi_{\nu_\mu}^{tar} \epsilon_{\nu_\mu} E_{\nu_\mu} dE}{N_{\nu_\mu}^{obs} \int \Phi_{\nu_\tau}^{tar} \epsilon_{\nu_\tau} K_F(E) E_{\nu_\tau} dE}$$

$$= \frac{N_{\nu_\tau}^{obs}}{N_{\nu_\mu}^{obs}} \times \frac{\epsilon_{\nu_\mu}}{\epsilon_{\nu_\tau}} \times \frac{N_{\nu_\mu}^{prod}}{N_{\nu_\tau}^{prod}} \times \frac{\int E_{\nu_\mu} (dN_{\nu_\mu}^{prod} / dE) dE}{\int K_F(E) E_{\nu_\tau} (dN_{\nu_\tau}^{prod} / dE) dE}$$

$= 1.5 \pm 0.5$ (error of (1)) ± 0.3 (error of (2)) (Preliminary)

$$\left\{ \begin{array}{l} \frac{N_{\nu_\tau}^{obs}}{N_{\nu_\mu}^{obs}} = \frac{(9 \pm \sqrt{9}) - 2.4}{(203 \pm \sqrt{203}) \times f_{prompt}} \dots (1) \quad , f_{prompt} = 0.57 \pm 0.07 \text{ (From the draft)} \dots (3) \\ \frac{\epsilon_{\nu_\mu}}{\epsilon_{\nu_\tau}} = \frac{0.73}{0.50} \\ \frac{N_{\nu_\mu}^{prod}}{N_{\nu_\tau}^{prod}} = 0.16 \pm 0.03 \dots (2) \quad (\text{From Emily's thesis - page 157}) \\ \frac{\int K_F(E) E_{\nu_\tau} (dN_{\nu_\tau}^{prod} / dE) dE}{\int E_{\nu_\mu} (dN_{\nu_\mu}^{prod} / dE) dE} = 0.348 \pm 0.002 \quad (\text{From Emily's thesis - page 160}) \end{array} \right.$$